

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/004093

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B01D53/94 F01N3/20 C01C1/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B01D F01N C01C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/100519 A (DAIMLER CHRYSLER AG ; GOERIGK CHRISTIAN (DE); DUVINAGE FRANK (DE); NOL) 19 December 2002 (2002-12-19) page 11, paragraph 2 - page 12, paragraph 1 page 14, paragraph 2 - page 16, paragraph 2; figures 2,4	1-40, 45-48
X	EP 1 023 935 A (DEGUSSA) 2 August 2000 (2000-08-02) column 2, line 39 - column 3, line 28 column 8, line 1 - line 40; figure 5  ----- -/-	34-40

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

16 July 2004

Date of mailing of the international search report

16/08/2004

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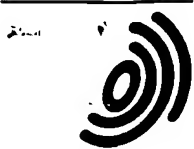
## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/094420 A (SCHUETTE RUEDIGER ; DEGUSSA (DE); ENGLER BERND (DE); LANG JUERGEN (DE)) 28 November 2002 (2002-11-28) page 14, line 33 - page 15, line 18; figure 3	34-40
X	PATENT ABSTRACTS OF JAPAN vol. 0154, no. 57 (M-1181), 20 November 1991 (1991-11-20) & JP 3 194111 A (SHINNENSHIYOU SYST KENKYUSHO:KK), 23 August 1991 (1991-08-23) abstract	34-36
A	WO 00/76637 A (NISSELROOIJ PETRUS FRANCISCUS ; GASTEC NV (NL); BOUWMAN WILLEM HENDRIK) 21 December 2000 (2000-12-21) page 4, line 32 - page 5, line 2 page 6, line 28 - page 7, line 33 page 10, line 3 - page 11, line 15	1-48
A	US 2002/073692 A1 (KATASHIBA HIDEAKI ET AL) 20 June 2002 (2002-06-20) paragraph '0059! - paragraph '0062! paragraph '0078! - paragraph '0079! paragraph '0142! - paragraph '0148!	1-48
A	EP 0 773 354 A (TOYOTA MOTOR CO LTD) 14 May 1997 (1997-05-14) column 5, line 4 - line 12 column 8, line 29 - column 9, line 33; figures 1,4a,4b	1-48
A	WO 03/009925 A (BALLARD POWER SYSTEMS ; KEPPELER BERTHOLD (DE); SCHUERSTEDT PETER (DE)) 6 February 2003 (2003-02-06) page 3, line 3 - page 4, line 2; figure 1	1-48
A	DE 195 10 804 A (DORNIER GMBH) 26 September 1996 (1996-09-26) claim 7; figures 1,4	45-48
A	WO 01/14698 A (MASSACHUSETTS INST TECHNOLOGY) 1 March 2001 (2001-03-01) page 7, line 12 - line 20; figure 1	45-48

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International Application No  
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Patent document cited in search report		Publication date		Patent family member(s)	Publication date
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			WO	02100519 A1	19-12-2002
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			JP	2000271447 A	03-10-2000
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			WO	02094420 A1	28-11-2002
			EP	1395352 A1	10-03-2004
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			AU	5579600 A	02-01-2001
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			JP	2003530982 T	21-10-2003
			WO	0076637 A1	21-12-2000
US 2002073692	A1	20-06-2002	JP	2002188431 A	05-07-2002
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			DE	69616235 D1	29-11-2001
			DE	69616235 T2	27-06-2002
			EP	0773354 A1	14-05-1997
			US	5782087 A	21-07-1998
WO 03009925	A	06-02-2003	DE	10135646 A1	06-02-2003
			WO	03009925 A1	06-02-2003
DE 19510804	A	26-09-1996	DE	19510804 A1	26-09-1996
WO 0114698	A	01-03-2001	US	6560958 B1	13-05-2003
			CA	2383551 A1	01-03-2001
			EP	1212520 A1	12-06-2002
			JP	2003529012 T	30-09-2003
			WO	0114698 A1	01-03-2001
			US	2002194835 A1	26-12-2002



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(Formalities and other matters)



Application No. <b>04 710 223.1 - 2113</b>	Ref. <b>DP-309749</b>	Date <b>30.11.2005</b>
Applicant <b>Delphi Technologies, Inc.</b>		

**Communication pursuant to Article 96(2) EPC**

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

**of 4 months**

from the notification of this communication, this period being computed in accordance with Rules 78(2) and 83(2) and (4) EPC.

One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (Rule 36(1) EPC).

**Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).**



Eijkenboom, A  
Primary Examiner  
for the Examining Division

Enclosure(s): 3 page/s reasons (Form 2906)



The examination is being carried out on the **following application documents**:

**Description, Pages**

1-43 as published

**Claims, Numbers**

1-48 as published

**Drawings, Sheets**

1/5-5/5 as published

1. Apparatus claims 1, 34, 41 and 45, respectively method claims 24, 37, 44, 47, have been drafted as separate independent claims. Under Article 84 in combination with amended Rule 29(2) EPC (OJ 1/2002, pages 2-3) an application may contain more than one independent claim in a particular category only if the subject-matter claimed falls within one or more of the exceptional situations set out in paragraphs (a), (b) or (c) of Rule 29(2) EPC. This is, however, not the case in the present application.

The various definitions of the method and apparatus given the independent claims make it uncertain as to what aspects constitute essential features. The subject-matter for which protection is sought in the independent claims is such that the claims as a whole are not clear and concise. Independent claims of the same category with different combinations of features render each other unclear, with the result that the requirements of Article 84 EPC are not met.

Moreover, it seems that the current set of claims also fails to fulfill the requirements for unity of invention (Art.82 EPC) since a NOx adsorber is not featuring in all independent claims and the presence of a reformer as common general concept is known from the prior art.

The claims should have been drafted including only the minimum necessary number of independent claims in any one category (Rule 29(2)) with dependent claims as appropriate (Rule 29(4)).

2. The wording of the claims furthermore lacks clarity, for example, in that:



- a) it is ambiguous what is meant by "in-line" and "off-line" since the latter term commonly indicates to the skilled person that an apparatus is not in operation.
  - b) it is quite obscure, for example in claim 1, what is meant by "...a first NOx adsorber (18) disposed in-line, capable of being disposed downstream of and in fluid communication with and engine...". Possibly, it is an unnecessarily complicated way of indicating that a NOx adsorber (18) is located in an exhaust gas system downstream of an engine (12). In addition, any indication to a "second" NOx adsorber is missing in the claim.
  - c) it also not understood, for example in claim 1, what is meant by "selective communication and upstream of" of an "off-line" reformer "capable of" producing a reformat. The question arises whether or not the reformer indeed produces reformat or not.
  - d) it is unclear what the adjective "*initial*" means in independent claim 24.
3. In view of the above objections it is not at present practicable to carry out a full examination of the application. The applicant is therefore requested to file suitable amendments upon which the further prosecution of the application is to be based.
  4. The examining division, however, concurs with the particular relevance of the documents cited in the International Search Report.

WO-A-02.100519 (D1) discloses (the relevant passages are cited in the International Search Report) a deNOx system with NOx-trap, DPF and SCR catalyst whereby H<sub>2</sub> is generated by fuel reforming and injected into the exhaust before the NOx-trap and NH<sub>3</sub> is generated by first treating air or exhaust gas in plasma producing NO which is subsequently converted with part of the H<sub>2</sub> into NH<sub>3</sub> in a reactor. Commonly, SCR catalysts are considered to being capable of storing NH<sub>3</sub>.

EP-A-1.023.935 (D2) discloses (the relevant passages are cited in the International Search Report) a deNOx method comprising burning fuel off-line producing NO which is subsequently used for NH<sub>3</sub>-generation in plasma reforming reactor, the NH<sub>3</sub> is then injected into the exhaust gas prior to contacting a SCR catalyst.

WO-02.094420 A (D3) discloses (the relevant passages are cited in the International

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Date  
Date 30.11.2005Blatt  
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Feuille 3Anmelde-Nr.:  
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Demande n°:

Search Report) a deNOx method comprising producing NO from air and fuel followed by NH<sub>3</sub> synthesis reactor, the NH<sub>3</sub> is injected into the exhaust gas stream before contacting a SCR catalyst.

JP-A-3.194.111 (D4) discloses (the references in parenthesis applying to this document) a deNOx method whereby H<sub>2</sub>/CO is formed by fuel reforming, the H<sub>2</sub> is used for the synthesis of ammonia in a reactor, the NH<sub>3</sub> is injected into the exhaust gas before contacting a SCR catalyst.

It appears that the subject-matter of the claims lacks novelty (Art.54(2) EPC) or at least inventiveness (Art.56 EPC) over the cited prior art.

5. When filing amended claims the applicant should at the same time bring the description into conformity with the amended claims. Care should be taken during revision not to add subject-matter which extends beyond the content of the application as originally filed (Article 123(2) EPC).

In order to facilitate the examination of the conformity of the amended application with the requirements of Article 123(2) EPC, the applicant is requested to clearly identify the amendments carried out, irrespective of whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based.